

CLAIMS

1. A fluid control device comprising: a valve case having a fluid channel; a casing provided above the valve case; a valve element opening and closing the fluid channel; a valve element holder moved between a closing position at which it is moved downward to set the valve element in a closed state and an opening position at which it is moved upward to set the valve element in an open state; an elastic member biasing the valve element to the closing position or the opening position; and a working member in automatic opening and closing, which is vertically moved by automatically opening and closing means to move the valve element holder to the opening position or the closing position against bias force of the elastic member,

the fluid control device further comprising a working member in manual opening and closing, which is vertically moved by a manual operation to press the valve element holder downward when it is moved downward.

2. The fluid control device of claim 1, further comprising a movable channel member movably fitted in a tube-shaped body serving as the working member in manual opening and closing, wherein the working member in manual opening and closing is arranged in a fluid-tight casing and moved to an automatic opening and closing enabled position at which there is a predetermined gap between the working member in automatic opening and closing and an upper surface of a part moving

integrally therewith, to an automatic opening and closing enabled position at which it abuts on the upper surface of the part moving integrally with the working member in automatic opening and closing, and to a working position at which it is 5 further moved downward to lower the working member in automatic opening and closing by manually operating an operation handle, the movable channel member is stopped at a position where its travel distance is smaller than a travel distance when the working member in manual opening and closing is moved from the 10 automatic opening and closing enabled position to the automatic opening and closing disabled position, a compressed fluid channel is formed in the working member in automatic opening and closing, which has an upper end provided in a lower part of the working member in manual opening and closing and extends 15 downward from the upper end to be continued to a compressed fluid inlet chamber, a compressed fluid channel positioned near a lower end of the movable channel member and a fluid outlet channel positioned near an upper end of the movable channel member are formed in the casing, a compressed fluid channel 20 continued to the compressed fluid channel of the casing when the working member in manual opening and closing is in the automatic opening and closing enabled position, and a fluid outlet channel continued to the fluid outlet channel of the casing when the working member in manual opening and closing 25 is lowered to the automatic opening and closing enabled position

are formed in the working member in manual opening and closing, and a compressed fluid channel which connects to the compressed fluid channel in the working member in manual opening and closing, to the compressed fluid channel in the working member 5 in automatic opening and closing when the working member in manual opening and closing is in the automatic opening and closing enabled position; and a fluid outlet channel which connects the fluid outlet channel in the working member in manual opening and closing to the compressed fluid channel in 10 the working member in automatic opening and closing when the working member in manual opening and closing is lowered to the automatic opening and closing enabled position and the movable channel member is relatively moved upward with respect to the working member in manual opening and closing, and shuts off the 15 connection when the working member in manual opening and closing is in the automatic opening and closing enabled position are formed in the movable channel member.

3. The fluid control device of claim 2, wherein means for stopping the movable channel member at a position where a 20 travel distance of the movable channel member is smaller than that of the working member in manual opening and closing includes an elastic member biasing the movable channel member downward, and a stopper provided in the working member in automatic opening and closing to prevent the movable channel 25 member from being further lowered.

4. The fluid control device of claim 3, wherein the movable channel member is in the shape of almost a circular column having a flange near its upper end, an annular groove in which the flange of the movable channel member is fitted so 5 as to be vertically movable, and a fluid outlet channel connecting the annular groove and the fluid outlet channel in the casing wall are formed in the working member in manual opening and closing, and an annular sealing member which is pressed downward by the flange of the movable channel member 10 biased by the elastic member at the automatic opening and closing enabled position is provided in the annular groove of the working member in manual opening and closing.

5. The fluid control device of any one of claims 2 to 4, wherein a projected portion is formed at an upper end of the 15 working member in manual opening and closing, a recessed portion is formed at a lower end of an operation axis fixed to the operation handle, a plurality of protrusions are formed at equal intervals in a peripheral direction on one of the outer periphery of the projected portion of the working member in 20 manual opening and closing and the inner periphery of the recessed portion of the operation axis, and grooves which are integral multiple of the number of the protrusions in number are formed at equal intervals on the other.

6. The fluid control device of claim 1, wherein the 25 working member in manual opening and closing serves as a

stem-shaped body which is moved by a manual operation to an automatic opening and closing disabled position at which a lower end presses a top surface center of the valve element holder downward and to an automatic opening and closing enabled 5 position at which the lower end is separated from the top surface center of the valve element holder, and the working member in automatic opening and closing serves as a tube-shaped body which is fitted in the stem-shaped working member in manual opening and closing so as to be relatively and vertically movable and 10 moved to a closing position at which a lower end is biased by the elastic member to press a top surface periphery of the valve element holder downward and to an opening position at which the lower end is separated from the top surface center of the valve element holder by automatically opening and closing means.

15 7. The fluid control device of claim 6, wherein an upper guide and a lower guide separated by a counter plate are formed in the casing, the working member in automatic opening and closing has an upper piston guided by the upper guide and a lower piston guided by the lower guide, a space between the counter 20 plate and the upper piston of the working member in automatic opening and closing is a compressed air inlet chamber, the working member in manual opening and closing has an axis-direction channel, a lower end diameter-direction channel extending from the axis-direction channel in a diameter 25 direction and continued to the compressed fluid inlet chamber

through a diameter-direction through hole provided in the working member in automatic opening and closing, and a middle diameter-direction channel extending from a middle part of the axis-direction channel in the diameter direction and continued 5 to the compressed fluid inlet portion provided at a peripheral wall of the casing body.

8. The fluid control device of claim 7, wherein the lower end diameter-direction channel of the working member in manual opening and closing and a space of a lower part of the lower 10 piston of the working member in automatic opening and closing are continued by a gap on an inner periphery of the working member in automatic opening and closing, a second diameter-direction through hole formed in the working member in automatic opening and closing, and a gap on an outer periphery of the working member 15 in automatic opening and closing.